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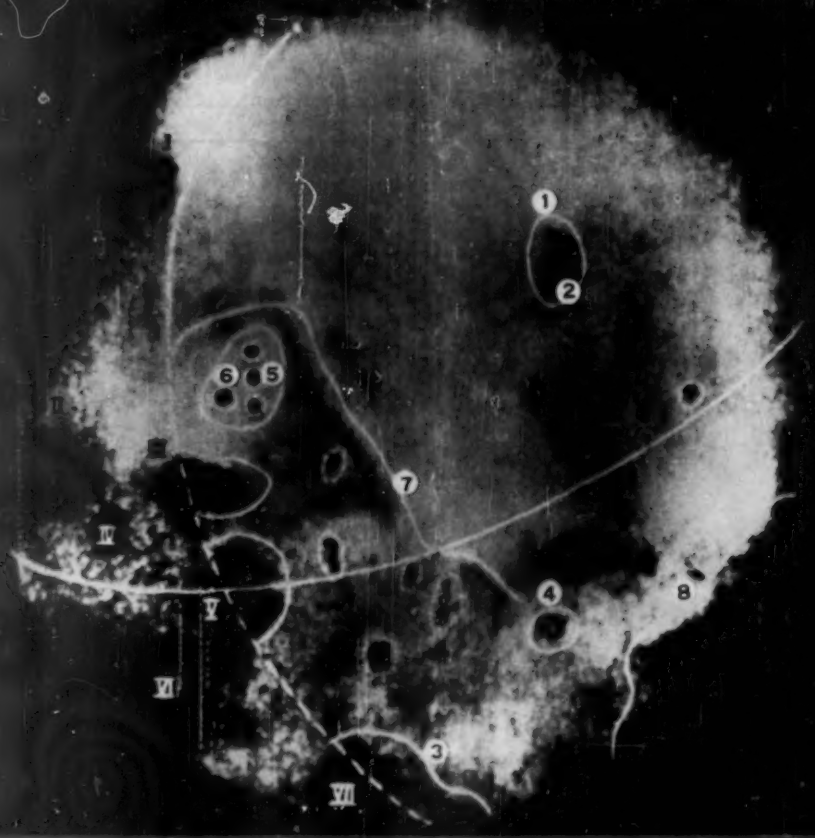
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



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See Page 304

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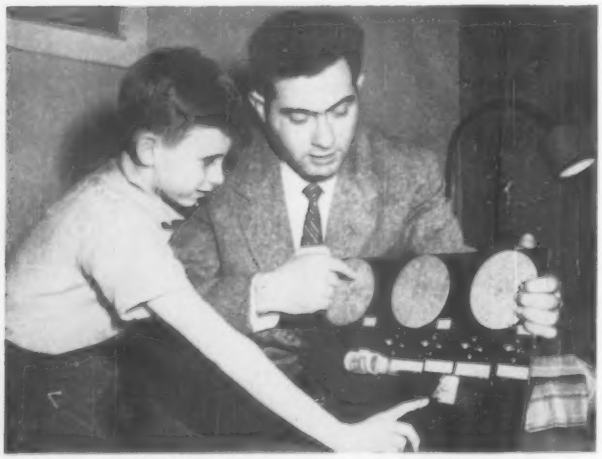

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MEDICINE

Report Heart Research

Current research reported to scientists at the American Heart Association meeting ranged from anticoagulants to surgery.

CHILLED BLOOD sent through the coronary arteries will cause the heart to come to a complete temporary standstill, enabling cardiac surgery to be performed more easily.

The procedure was described at the scientific session of the American Heart Association in Philadelphia by Dr. Vincent L. Gott of the University of Minnesota Medical School. During the past year, he said, patients' hearts had been stopped for 45 to 60 minutes by chilling their blood supplies to 62 degrees Fahrenheit or below.

The resulting heart stop allowed surgeons to operate on an immobile and dry heart while heart-lung machines maintained circulation to the rest of the body.

Since 1957 surgeons have been able to stop the heart with drugs. The heart starts again when normal circulation is restored and the returning blood washes out the drug.

The use of chilled blood to stop the heart offers several advantages over the drug method, according to Dr. Gott. Cold blood can be sent through the heart muscle from time to time as desired. This prevents oxygen "starvation" of the heart muscle and minimizes undesirable changes in the chemistry of the heart.

The new method makes it possible, Dr. Gott said, to still the heart for a much longer period of time than is usually considered safe with drugs.

Anticoagulants Affected

BARBITURATES, widely used in sedatives or sleeping pills, can interfere with the action of anticoagulant drugs often prescribed to help ward off blood clots in patients with heart or artery disease.

If barbiturates are taken before anticoagulants, the anti-clotting drugs lose their effect, Dr. Murray Weiner of New York City told the Heart Association.

Studies in both animals and humans, he said, showed that the barbiturates apparently prevent the anticoagulants from being absorbed. When sedatives or sleeping pills were given five hours after the anti-clotting drugs, however, this inhibiting effect was not seen.

Too Much Adrenalin

COMPETITIVE, "hard driving" men apparently may get heart disease earlier and oftener than more relaxed persons due to an over-secretion of adrenalin, Dr. Meyer Friedman of San Francisco reported.

Dr. Friedman, a proponent of the theory that "go-getting" men are more likely to suffer heart attacks than others, told the Association that he found the adrenal glands of "hard drivers" apparently produced more adrenalin and a closely related hormone, noradrenalin, during the working day than the glands of a comparable group of easy-going men.

Studies have shown that men of aggressive behavior patterns had "six to eight times" as much heart disease as those with relaxed personalities. Excessive production of these two hormones during working hours suggests a mechanism through which the personality factor may operate, he said.

Blood Fat Level

HEREDITY is a more important factor than environment in determining the level of certain blood fats sometimes associated with heart disease.

A study of 2,500 persons living in "highly urban" Manhattan and "semi-rural" Staten Island, two different environments, revealed "strikingly similar" average blood cholesterol levels among the residents of both areas. Similar levels within family groups in both areas were also found, providing evidence of a genetic link.

Cholesterol is a fatty substance found in many foods and also manufactured in the body. It is viewed by many doctors as a cause of narrowing and hardening of the arteries.

Other physcians point out that this hypothesis has not been proved.

Results of the study were reported to the American Heart Association by Drs. Louis E. Schaefer, David Adlersberg and Arthur G. Steinberg of New York City.

EXPLORER VII—One of the scientists inspects the satellite on the fourth stage of rocket prior to the launching of the Juno II rocket carrying Explorer VII, with a 91.5-pound satellite into orbit. The launching was under the direction of the National Aeronautics and Space Administration, at Cape Canaveral, Fla. *(See p. 301.)*

Operation Cures

AN OPERATION that can cure a condition usually fatal in more than 75% of cases was described to the American Heart Association.

The condition is dissecting aneurysm of the aorta, and occurs when the inner lining of this main artery carrying blood from the heart becomes torn, permitting blood to leak between the inner and outer walls of the vessel. In some cases the condition is naturally alleviated, but in approximately 75% of cases the weakened wall ruptures, causing the patient to bleed to death internally.

Until five years ago, treatment of this condition was unsatisfactory, Dr. Michael E. De Bakey, Baylor University College of Medicine, Houston, Texas, reported. Since then, however, he and his associates have operated on 48 persons with dissecting aneurysms, cutting out the affected section of the aorta and replacing it with a blood vessel graft.

New Blood Dissolver

PAIN, DISABILITY and death resulting from blood clots in the extremities may be reduced significantly by the use of a new clot-dissolving agent.

The drug, a form of human fibrinolysin, was used by Dr. Kenneth M. Moser of the Georgetown University Medical Center, Washington, D. C., to treat a group of patients suffering from severe thrombophlebitis (clotting of veins in the arms and legs). The results of the study were reported to the Heart Association.

The study was made on 62 patients, 30 of whom were given standard anticoagulant treatment and 32 of whom were given fibrinolysin in addition to the standard treatment.

The standard-treatment group suffered pain 76% longer, edema 50% longer, and were bedridden 40% longer than those treated with fibrinolysin.

No toxin reactions to the fibrinolysin infusions were reported, except for a temperature rise in about half the patients. These reactions were treated by aspirin and antihistamines.

Participating with Dr. Moser in the study were Drs. George C. Hajjar and Stephen B. Sulavik of Washington, D. C.

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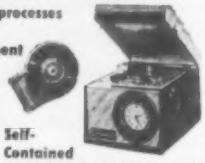

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ROCKETS AND MISSILES

Pentagon Reports Discoverer VI Down

THE DEPARTMENT of Defense reports that America's Discoverer VI satellite fell back to earth between 5 and 8 p.m. Oct. 20, one day later than scientists had estimated.

The Discoverer had completed its 965th pass, and no report was given as to where the vehicle may have come down.

The 1,700-pound Discoverer VI was launched Aug. 19 into a polar orbit. It carried a 300-pound reentry capsule which was not recovered.

The Smithsonian Astrophysical Laboratory at Cambridge, Mass., reports that Explorer IV fell two days later, on Oct. 22. Launched July 26, 1958, the 38.4-pound satellite carried experiments for measuring corpuscular radiation at several intensities and temperatures inside the satellite. (See p. 301.)

Science News Letter, November 7, 1959

MEDICINE

Hypnosis Loses Favor Of Some Researchers

HYPNOSIS is becoming less popular as a medical tool, due to the abuse and misuse of hypnotism by novices, Dr. Bernard B. Raginsky of Montreal, president of the special panel on clinical hypnosis of the Pan American Medical Association, reported.

Hypnosis is used much more in the U.S. and in South American countries than in Canada, he said, but many doctors who want to learn hypnosis do not want to learn the psychological aspects of its use.

However, it is very popular for childbirth and also certain phases of dentistry, and is a helpful tool when the doctor wants to reduce the patient's anxiety. This is particularly true in dentistry.

Also, hypnosis can be useful to the surgeon who wishes to keep the patient absolutely still or prevent him from coughing, Dr. Raginsky said. The novice, however, wants to use hypnosis in every case, often where it does not apply.

An Effective Tool

It can also be an effective tool where ordinary psychotherapy does not work. For instance, many times a patient is hiding something from himself, the Montreal scientist said. An example would be the pilot who does not want to admit that he caused a crash. This can be drawn out of a patient with the aid of hypnosis.

Contrary to some reports, a person will do things under hypnosis that he would not do ordinarily, Dr. Raginsky said. He reported how, during World War II, he induced a soldier, while under hypnosis, to attack his commanding officer.

"He almost slit the officer's throat, because I had convinced him that the officer was a Japanese soldier," Dr. Raginsky reported.

Delving into the field of space medicine, Dr. Raginsky said it had been suggested that the seven astronauts be put under hypnosis for their space flights. Hypnosis will reduce the spaceman's metabolism without reducing his mental powers.

The Russians are preparing their astronauts for space flight by Pavlovian conditioning, he said. This is a simple type of learning for which the Russian physiologist, Pavlov, is famous.

It consists of associating a stimulus for which the body has an automatic response with another, neutral, stimulus. A famous example of this was the association of the sound of a bell with the sight or smell of food until a dog's mouth would water at the sound of a bell alone.

Science News Letter, November 7, 1959

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ROCKETS AND MISSILES

Calendar of Satellites

The following listing of satellites launched and space probes made includes important data on these man-made heavenly bodies sent into space by Russian and American scientists and engineers.

First date is launching. Second date is fall, if not still in orbit. Next figure is period. p—perigee, closest distance to earth. a—apogee, farthest distance from earth. i—inclination of orbit to earth's equator. Orbited weights follow, with word-descriptions of experiments, results or significant findings. Principal data from the National Aeronautics and Space Administration.

SPUTNIK I, USSR. October 4, 1957-Jan. 4, 1958. 96.17 minutes. p 142 miles, a 588 miles, i 65 degrees, About 4 tons orbited, 184 lb. instrumentation. Measured internal temperatures, pressures.

SPUTNIK II, USSR. Nov. 3, 1957-April 14, 1958. 103.7 minutes. p 140 miles, a 1,038 miles, i 65 degrees. About 4 tons orbited, 1,120 lb. instrumentation. Cosmic, solar-ultraviolet and X-radiation; carried "Laika" (dog).

EXPLORER I, USA. Jan. 31, 1958, estimated life 3 to 5 years. 109.6 minutes. p 218 miles, a 1,284 miles, i 33.34 degrees. 30.8 lb. orbited, 18.13 lb. instrumentation. Discovered first Van Allen radiation belt while measuring cosmic rays, micrometeorites, temperatures.

VANGUARD I, USA. March 17, 1958, estimated life 200 to 1,000 years. 133.9 minutes. p 403.9 miles, a 2,452 miles, i 34.24 degrees. 3.25 lb. orbited plus 50-lb. 3rd stage rocket. Helped show earth is pear-shaped through geodetic measurements. Still transmitting.

EXPLORER III, USA. March 26-June 27, 1958. 115.87 minutes. p 121 miles, a 1,746 miles, i 33.4 degrees. 31 lb. orbited, 18.56 lb. instrumentation. Cosmic rays with tape recorder. Micrometeor gauges, temperatures.

SPUTNIK III, USSR. May 15, 1958, estimated to Dec. 1959. 97.0 minutes. p 123 miles, a 643 miles, i 65.3 degrees. About 7,000 lb. orbited, 2,925 lb. instrumentation. Air pressure and composition, positive ions, satellite's electrical charge and tension of earth's electrostatic and magnetic fields, sun's corpuscular radiation, composition of primary cosmic radiation. Still transmitting.

EXPLORER IV, USA. July 26, 1958-Oct. 22, 1959. 93.2 minutes. p. 151.4 miles, a 386 miles, i 50.29 degrees. 38.4 lb. orbited, 25.8 lb. instrumentation. Corpuscular radiation at several intensities, internal temperatures.

PROJECT SCORE, USA. Dec. 18, 1958-Jan. 21, 1959. 101.46 minutes. p 110 miles, a 920 miles, i 32.3 degrees. 8,750 lb. orbited. 150 lb. instrumentation. Broadcast President Eisenhower's Christmas message; accepted and relayed messages from ground stations in Texas, Arizona and Georgia.

VANGUARD II, USA. Feb. 17, 1959, expect 10-year life. 125.5 minutes. p 354 miles, a 2,035 miles, i 32.88 degrees. 20.74 lb. orbited. Cloud cover.

DISCOVERER I, USA. Feb. 28-March 5, 1959. 95.9 minutes. p 99 miles, a 605 miles, i 87 degrees. 1,300 lb. orbited, 245 lb. instruments. Checked rocket propulsion, guidance and staging, and communications.

DISCOVERER II, USA. April 13-April 26, 1959. 90.5 minutes. p 142 miles, a 220 miles, i 89.8 degrees. 1,610 lb. orbited, 245 lb. instruments and 195 lb. capsule. Capsule recovery failed. Experiment to maintain temperature and oxygen to sustain life; carried emulsion packs to measure radiation.

EXPLORER VI, USA. Aug. 7, 1959, estimated life of over 1 year. 12.7 hours. p 155 miles, a 26,276 miles, i 46.9 degrees. 142 lb. orbited. Measured earth radiation; TV cloud cover scanning; solar recharging of batteries; micrometeorites; magnetic field of earth; behavior of radio waves.

DISCOVERER V, USA. Aug. 13-Sept. 28, 1959. 94 minutes. p 136 miles, a 450 miles, i 90 degrees (polar). About 1,700 lb. orbited, including 300-lb. reentry capsule, not recovered.

DISCOVERER VI, USA. Aug. 19, 1959-Oct. 20, 1959. 91.9 minutes. p. 115 miles, a 344 miles, i 90 degrees (polar). 1,700 lb. orbited, including 300-lb. reentry capsule, not recovered.

VANGUARD III, USA Sept 18, 1959, estimated life 30 to 40 years. 130 minutes. p 318 miles, a 2,330 miles, i 33.34 degrees. 100 lb. orbited, including 50 lb. scientific payload. Measurements of earth's magnetic field, solar X-rays, environmental conditions in space.

EXPLORER VII, USA. Oct. 13, 1959, estimated life 20 years. 101.29 minutes. p 316.6 miles, a 701.9 miles, i 50.07 degrees. 91.5-lb. satellite orbited. Weather research, earth's radiation balance, micrometeorites, space temperatures.

Space Probes

PIONEER I, USA. Oct. 11-12, 1958. Climbed 70,700 miles. Determined radial extent of radiation band. First observation that radiation is a band. First observation of hydromagnetic oscillations of magnetic field of earth. Discovered departure of magnetic field from theoretical prediction. First determination of micrometeor density in space. First measurement of magnetic field in space.

PIONEER III, USA. Dec. 6-7, 1958. Climbed 63,580 miles. Discovered second radiation belt around the earth.

LUNIK (MECHTA), USSR. Jan. 2, 1959. Orbiting sun on 15-month cycle. 3,245 lb. orbited, 794.8 lb. instrumentation. Temperature and pressures inside vehicle, study gas components of interplanetary matter and corpuscular radiation of sun; magnetic field of earth and moon; meteoric particles; heavy nuclei in primary cosmic radiation.

PIONEER IV, USA. March 3, 1959. Now orbiting sun. Passed moon at 37,300 miles. 13.4 lb. orbited. Measuring radiation in space.

LUNIK II, USSR. Sept. 12-13, 1959. Traveled 236,875 miles and hit moon near Sea of Tranquillity. Temperature, pressure, earth-moon magnetic fields, radiation, meteorites.

LUNIK III, USSR. Oct. 4, 1959. "Unlimited" life expectancy. Circled moon, returned to earth orbit. Expected orbit data: p 24,853 miles, a 292,000 miles. About 13-day period.

PHYSIOLOGY

Emotions Affect Hearing

EMOTIONAL factors affect hearing loss, three scientists reported to the Acoustical Society of America meeting in Cleveland, Ohio.

They have classified the psychic causes of hearing loss into three groups:

1. Availability, the existence in a person's life history of a "model" for deafness. This may be a period of temporary, partial deafness or close association with a deaf person.

2. Necessity, the discomfort, fear or frustration resulting from a person's attempts to adjust to the world in which he lives and for which he can find no solution except to shut out part of that world.

3. Maintenance, the advantages or gains given to the person because of his symptom, such as care and attention from others around him, exemption from certain efforts or difficulties on account of his "handicap," a sense of being "special."

Drs. Jane Farley, A. J. Derbyshire and Richard L. Carter of the Parmly Foundation for Auditory Research, Illinois Institute of Technology, Chicago, found these characteristics in a preliminary study aimed at discovering the emotional and social factors that may cause or contribute to loss of hearing.

Emotionally based hearing losses, they believe, are so common that their explanations apply to the life of virtually every person.

Human beings, they reported, are "organically deaf" to such high pitched sounds as made by a dog whistle. Every person is also to some extent "physically deaf," they noted.

The child who hears "ice cream" more easily than the similar sounding "wipe clean," and the mother who sleeps through the alarm clock but wakes instantly at the first whimper of her sleeping infant are two commonplace examples of selective perception.

The scientists attempted to explain how emotional factors operate to select what is heard and not heard, and also what particular psychic factors may do the selecting.

They found their subjects have certain common needs, attitudes and biographical facts that can be used to distinguish "deafness prone" individuals. In the group they studied, each person showed a need to avoid, rather than meet and solve, unpleasant or highly charged situations. The persons were also strikingly willing or anxious to sacrifice, or otherwise debase or injure themselves "for others."

Most characteristic, they found, was the ability of their experimental subjects to create and maintain a kind of "fantasy world"—not the hallucinations of a psychotic patient, but the wishful and sometimes fearful daydreams of love and glory that all persons have, made more substantial, more continuous and more resistant to the distractions of the workaday world.

Science News Letter, November 7, 1959

MEDICINE

"Blue Baby" Aids Adults

THE HEART condition that causes "blue babies" is being duplicated in adults to relieve heart pain.

The new operation is based on the observation that "blue babies" have a very rich coronary blood supply, Dr. Stacey B. Day, University of Minnesota, explained to the American Heart Association meeting in Philadelphia. Now, Dr. Day and his coworkers have attempted to duplicate this condition in adult hearts, although not to the extent that the patient will be harmed or turn bluish.

Blue babies are born with a combination of heart and circulatory defects that prevents their blood from receiving enough oxygen. Such blood tends to be bluish and gives a blue cast to the skin. Apparently the highly developed coronary blood supply seen in these children is utilized by the body to keep the heart working efficiently despite its inborn defects.

The severe pain that occurs in coronary artery disease, however, does not mean that the blood lacks oxygen as such, but rather, that not enough oxygen-carrying blood reaches the heart muscle because of a narrowing or shut-down of part of its blood vessel system. Dr. Day and his associates decided to try to exploit the body's compensatory mechanisms, as reflected in the blue babies' hearts, by bringing some "blue," venous, blood almost directly into the heart muscle.

They tapped the pulmonary artery, through which de-oxygenated or venous blood returns from the right side of the heart to the lungs for fresh oxygen. Openings in this artery and in the left side of the heart were joined to provide a route for a small amount of venous blood.

The researchers believe this oxygen-poor blood, by raising the carbon dioxide content of the blood in the coronary arteries, should stimulate the non-diseased branches of the coronary network to enlarge. It should also spur the growth of new "collateral" blood vessels within the heart. The result, they hope, will be that both the amount and distribution of the total blood flow through the ailing muscle will improve.

The operation has been performed on three adults so far. Each patient had suffered severe heart pain. In each case, there was a dramatic and sustained pain relief, improvement in health, and early return to gainful employment after the operation, the surgeon reported. Dr. Day stressed that only patients whose heart pain is due to narrowed coronary arteries, as established by careful examination and X-ray studies, were candidates for operation.

Science News Letter, November 7, 1959

ASTRONOMY

Sun's Magnetic Field Reverses Its Direction

THE SUN has reversed the polarity of its magnetic field, Dr. Harold D. Babcock of Mount Wilson and Palomar Observatories, Pasadena, Calif., reports.

Although the sun's magnetic field is very weak, comparable to that of the earth, it can be measured by an instrument known as a solar magnetograph.

Dr. Babcock found the polarity of the sun's magnetic field was opposite to that of the earth's from 1953 to 1957. About the middle of 1957, the polarity of the magnetic field near the sun's south pole reversed. Reversal of the field near the sun's north pole was not observed until November, 1958.

Thus, for more than a year, the sun had two poles of the same sign.

At present, Dr. Babcock reports in the *Astrophysical Journal* (Sept.), "the sun's polar field is parallel to that of the earth." Astronomers do not yet understand what great forces within the sun caused the reversal.

Mount Wilson and Palomar Observatories are operated jointly by the California Institute of Technology and the Carnegie Institution of Washington.

The magnetic fields of other stars have been observed to reverse their polarity, sometimes within a period of days, but their fields are much stronger than that of the sun.

Science News Letter, November 7, 1959

Questions

ARCHAEOLOGY—What was the wealth scientists recently found in Sardis, Turkey? p. 304.

METEOROLOGY—How soon do meteorologists expect to make 30-day predictions as accurate as the five-day predictions are now? p. 306.

PHYSICS-CHEMISTRY—For what research did two physicists receive the Nobel Prize? p. 303.

PHYSIOLOGY—What are some examples of "selective perception"? p. 302.

Photographs: Cover and p. 303, United Press-International Telephoto; p. 299, U. S. Army; p. 306, Fremont Davis; p. 312, Dialite Mfg.

PHYSICS-CHEMISTRY

Name Three Nobelists

Two American physicists and one Czechoslovakian chemist, first scientist to receive a Nobel Prize in his country, named to receive Nobel Prize in Physics and Chemistry, 1959.

THE 1959 Nobel Prize in Physics was awarded to two scientists who deal with the strange world of the atomic nucleus.

Drs. Emilio Segre and Owen Chamberlain of the University of California led the Radiation Laboratory team that discovered the anti-proton in 1955 using the bevatron, a powerful atom smasher. Dr. Chamberlain is now a visiting professor at Harvard University.

The anti-proton, or negative proton, is one of a group of subatomic particles having properties opposite to those of ordinary matter. One outstanding property of anti-matter particles is that when they come close to ordinary protons or neutrons, the two annihilate each other, releasing a large amount of energy.

The energy released in annihilation is several hundred times that in the corresponding reaction in hydrogen thermonuclear fusion.

Anti-protons are born and "live" only outside the nucleus following some high energy nuclear event similar to the collision resulting from bevatron bombardment, when the anti-matter particle is created from energy.

Two astronomers have suggested that clashes of matter with anti-matter, destroying both, could cause the broadcasting of radio waves from space picked up on earth by the giant antennas called radio telescopes. They calculated that the most anti-matter that could be present in the Milky Way galaxy in which the sun and its planets, including earth, are found is one part in 10,000,000.

Physicists have for several years known about the anti-particles of pi mesons, the glue that keeps atomic cores from flying apart. However, for the very rare hyperons, only one anti-particle has so far been found, the negative lambda.

Hyperons are unstable particles from the atomic nucleus, heavier than the proton or neutron. They live for only billionths of a second, but during that fleeting lifetime their existence is just as real as that of a neutron, which lasts for about 12 minutes before decaying into a proton.

One question puzzling physicists, therefore, is exactly what are fundamental particles. Neutrons and protons, both found in the nuclei of atoms, are fundamental, physicists agree. They are still debating where to draw the line, however, since the number of strange fragments found in the debris of smash-ups between atoms is bewildering. Some 30 particles are now known or expected to be found.

The anti-particles of hyperons still to be discovered include one each for the three kinds of sigmas known and one for the negative xi.

THE INVENTION and development of one of the foremost methods of chemical analysis by instruments won the 1959 Nobel Prize in Chemistry for Prof. Jaroslav Heyrovsky of Charles University, Prague, Czechoslovakia.

The polarographic method of analysis depends on the different speeds with which ions travel in solution under the influence of an electric field, and the ease with which atoms part with their electrons to form ions.

It is used extensively in chemical laboratories around the world both in industry and for research. The method is particularly valuable in the field of metallurgy.

Its advantages include easily reproducible results and ability to show the presence of chemicals present only in very small amounts. Other outstanding features of the method are its rapidity of operation, the possibility of analyzing solutions the size of a drop, the fact that in most cases the solution remains unaltered during the analysis and can later be used for other purposes, and the recording of results automatically on a graph to provide a permanent record of the analysis.

The method . . . also gives simultaneous quantitative and qualitative analysis of several components of a solution.

The first polarograph was constructed in 1925, and resulted from Prof. Heyrovsky's studies of electrolyses with a dropping mercury cathode. Electrolysis is the passage of an electric current through a solution, resulting in the movement of ions to positive and negative electrodes.

A technical definition of the polarographic method of analysis as given by Dr. Otto H. Muller, associate professor of physiology, State University of New York Medical Center at Syracuse, N. Y., is:

The polarographic method may be defined as a method of analysis based on the electrolysis of a minute fraction of a solution in a cell consisting of one small, easily polarizable, and one large, non-polarizable electrode.

(In electrolysis, polarization is the increase of the resistance of a solution due to gas accumulation at the electrode or chemical depletion in part of the solution.)

The voltage necessary for the electrolysis indicates the nature of the reacting substance, while the current observed indicates its concentration.

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PRIZE WINNERS—American scientists Drs. Emilio Segre, Owen Chamberlain and Czechoslovakian Prof. Jaroslav Heyrovsky, Nobel Prize winners for 1959, are shown left to right.

ASTRONOMY

Russians Release Photos Of Moon's Far Side

See Front Cover

RUSSIAN scientists have released a photograph of the far side of the moon as taken from U.S.S.R. satellite Lunik III.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows the far side of the moon.

Soviet astronomers identify the long solid lines as the moon's equator. The heavy broken line at the left separates the part of the moon visible from the earth from the portion that cannot be seen. Solid lines surround objects absolutely established; objects that need more clarity of form are enclosed in heavy dotted lines; fine-dotted lines are around objects now being classified.

The arabic numerals, as given by Soviet astronomers, are as follows: 1—Moscow Sea, a crater 187 miles in diameter; 2—Astronauts' Bay of Moscow Sea; 3—Continuation of South Sea on the Moon's Face; 4—Crater of the main Tsiolkovsky Hill; 5—Crater of central Lomonosov Hill; 6—Joliot-Curie Crater; 7—Soviet Mountains; and 8—Sea of Dreams.

The Roman numerals designate areas visible from the earth: I—Humbolt's Sea; II—Sea of Crises; III—Marginal Sea; IV—Sea of Waves; V—Smyth's Sea; VI—Sea of Fertility; and VII—Southern Sea.

The apparent lack of craters and seas across much of the far side of the moon seems to corroborate a theory that predicted this side would be largely smooth. Some scientists believe at least some of the topography of the moon has resulted from the tug of the earth's gravity; thus the stresses and strains of this pull would be responsible for some of the surface.

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ARCHAEOLOGY

Ancient Crime Unearthed By Archaeologists

A CLEVER crime has gone undetected from the time it was committed in the Middle Ages until it was disclosed this summer by Harvard and Cornell archaeologists digging on the site of the ancient Lydian city of King Croesus (famous for his wealth) in Sardis, western Turkey.

In the ruins of a Roman gymnasium, the archaeologists dug up a very heavy jar with the top tightly sealed with a lead lid. But when the lid was removed, the jar no longer contained the jewels or other valuables that apparently had once been buried in it. Instead, nothing but earth and stones were found. When it was buried, the scientists believe, a thief immediately removed the treasure, substituting earth and stones to delay detection of his crime.

The scientists did find wealth in Sardis, however. It consisted mainly of many ancient coins, glassware of great refinement and delicacy, decorated pottery, terracotta figurines and sculptures.

More than 3,000 years of history were spanned by the objects found, from the second millennium before Christ, represented by crude cooking pots, to the 15th century after Christ when the city was destroyed.

One of the interesting finds at Sardis was an ancient shopping center, containing shops and restaurants. An unusual feature of the shopping center was a luxurious public toilet with marble seats.

The Sardis expedition was under the direction of Prof. George M. A. Hanfmann of Harvard. Associate director was Dean A. Henry Detweiler of Cornell.

A last-minute discovery made when the scientists were ready to stop digging for the season was of an Imperial inscription which appeared among the tumbled fragments of a large triple gate. The inscription mentions an emperor whose name is not preserved and an "Empress Julia." The scientists believe the gate was dedicated to the Empress Julia Domna, daughter of the high priest of the Sun God and wife of the Emperor Septimius Serverus. This Empress Julia was renowned for her beauty and her intellectual interests but she finally ended her career by starving herself to death in 217 A.D.

Science News Letter, November 7, 1959

MEDICINE

Study Shows Cancer Drug Too Toxic for Human Use

THE ANTI-TUMOR drug, 5-fluorouracil, that seemed to have promise a year ago, now appears to be too toxic for human use.

Attempts to pinpoint just how much of the drug might give a good anti-tumor response with reasonable safety were disappointing, the researchers say in *Cancer Research* (Oct.). Even giving the patient the largest dose he could tolerate of 5-fluorouracil, or FU, resulted in limited anti-tumor activity, they explain.

Of the 128 patients in the study group, eight showed "objective evidence of tumor regression" most of which was temporary. Only one of these patients showed severe toxic symptoms.

Dose rates were four, six or eight milligrams per kilogram body weight per day for a period of from 14 to 42 days. Toxicity symptoms included reduced white blood cell count, nausea, vomiting, diarrhea, oral ulcerations and loss of hair. Toxicity seemed to be less when the drug was given orally instead of intravenously, the researchers say.

"It seems unlikely that FU will contribute significantly to the therapy of cancer patients," they conclude.

The researchers include Drs. G. Lennard Gold and Clyde O. Brindley, National Cancer Institute, Bethesda, Md.; Thomas C. Hall and Marguerida M. Dederick, Harvard Medical School; Bruce I. Shnider, Georgetown University School of Medicine, Washington, D. C.; Oleg Selawry and James F. Holland, Roswell Park Memorial Institute, Buffalo, N. Y.; Jacob Colsky and Ralph Jones, Jackson Memorial Hospital, Miami, Fla.; and Albert H. Owens, Jr., Johns Hopkins University School of Medicine.

Science News Letter, November 7, 1959

IN SCIEN

ASTRONOMY

Russian Astronomers Study Moon Extensively

BESIDES the recent photographs of the unseen side of the moon made from a Soviet rocket, Russian astronomers are engaged in a whole series of scientific studies of the moon.

Prof. A. A. Mikhaylov, director of the Pulkovo Observatory, has reported that the newest methods are being used in making measurements of the moon's temperature as it changes from crescent to full phase, and in studying the polarization of light reflected from different parts of the surface.

Russian astronomers are also making a detailed investigation of the possibility that gases are flowing from Alphonsus Crater, as Prof. Nikolai A. Kozyrev reported seeing during 1958.

Photographic observations of the moon against the background of surrounding stars are being made by Kh. I. Potter, Pulkovo's chief astronomer. Object of the program is to define more accurately the theory of the moon's movement, and to study the irregularity in the earth's rotation rate caused by the shifting of masses on the earth's surface and inside it. Prof. Potter has already obtained more than 200 photographs.

A large double refracting telescope for making detailed studies of the moon's surface features is scheduled to be installed at Pulkovo Observatory's mountain station near Kislovodsk.

Details of the expanded lunar observing program are reported by the U. S. Department of Commerce's Office of Technical Services.

Science News Letter, November 7, 1959

GEOLOGY

Find Asteroid Site In West Texas

SIERRA MADERA, a "deranged and jumbled" geological structure in western Texas, has been found by Government geologists to be the site where an asteroid from outer space exploded as it struck the earth about 50,000,000 years ago.

Geologists visiting McDonald Observatory, jointly operated by the University of Texas and the University of Chicago, based their conclusions on the abundance of "shatter cones" in the area. These cones are small structures that indicate disruption of rock by an intense shock wave such as can only be caused by meteoritic impact and not by volcanic explosion, they said.

The cones were found in greater abundance than in any other similar structure in the world.

Science News Letter, November 7, 1959

CE FIELDS

ACOUSTICS

Deafening by Loud Noise Reduced by "Packaging"

THE DEAFENING effects of exposure to severe noise can be reduced by "packaging" the exposure into short, widely spaced doses.

Two scientists from Indiana University told the Acoustical Society of America meeting in Cleveland that exposure to intense noise may produce a partial deafness that is permanent. To learn more about the factors involved in deafening, Drs. James D. Miller and Charles S. Watson tested cats trained to respond to test sounds.

Using these trained animals, the effects of noise on hearing sensitivity were found by means of hearing tests similar to those used for humans. First, Drs. Miller and Watson determined the duration and intensity of noise severe enough to produce a sizable hearing loss in the cats. Then they tried a much shorter exposure to this same noise and found that this did not produce permanent deafness.

Using this short and harmless exposure as a package, animals were exposed repeatedly until the total time in the noise added up to the duration that had produced deafness during a single exposure.

They found the amount of hearing loss was reduced by rest intervals between successive exposures to noise. When rest periods were very long, little or no permanent loss of hearing was measured.

The best protection against noise-induced deafness is reduction of the intensity of the noise to safe levels, they reported. However, in cases where noise reduction is impossible, they suggested that personnel could be rotated on and off duty according to a schedule that would prevent permanent hearing damage.

Science News Letter, November 7, 1959

PUBLIC HEALTH

Find Little Danger to Genes From TV

THE POSSIBILITY of the television viewer's receiving a damaging dose of radiation while watching the screen is "extremely remote."

Even from the genetic point of view, the amount of radiation emitted by the conventional TV set appears reasonable, two researchers at the Francis Delafield Hospital's physics laboratory, New York, report.

Field and laboratory tests have shown the yearly average radiation dose is at least less than five percent the dose due to the average natural background radiation to the gonads, Drs. Carl B. Braestrup and Richard T. Mooney report in *Science* (Oct. 23). Using highly sensitive instruments to measure the low level of radiation emitted by television sets, the scientists reached these conclusions after considering such factors as the viewing panel and glass, the distance between viewer and set, and the amount of time spent in TV watching.

However, the possibility of somatic, or non-inheritable, injuries to personnel during testing and servicing TV sets should not be overlooked, the scientists point out.

They explain their tests involved only the panel of the television tube. Radiation transmitted by the funnel and other parts of the tube may be greater, they suggest. Also, radiation levels as high as one roentgen per hour have been measured for other types of television tubes. (One suggested maximum exposure to radiation, not including background radiation, for the years from conception to age 30 is 10 roentgens.)

Work involving closed circuit television, electron microscopes and theater-projection-type TV tubes should not be considered safe until this has been established by dependable radiation measurements, Drs. Braestrup and Mooney say.

Science News Letter, November 7, 1959

PHARMACOLOGY

Synthetic Penicillin May Make "Shot" Obsolete

A SYNTHETIC penicillin pill will soon be available, Bristol Laboratories, Syracuse, N. Y., announced.

The new compound, Syncillin, promises to make the penicillin injection obsolete, Dr. Amel R. Menotti, Bristol scientific director, said.

Early tests indicate the synthetic antibiotic will not give as many persons the dangerous allergic reactions attributed to penicillin "shots," Dr. Menotti explained. It seems that the enzyme penicillinase, produced by some microorganisms, is not as active in destroying Syncillin.

When given orally, the new antibiotic appears to be more potent than several injectable or other oral forms of penicillin. It produces twice the blood activity of potassium penicillin V, for example. In test tube studies, the synthetic penicillin destroyed staphylococcal strains that are resistant to other penicillins.

Syncillin is a colorless, crystalline material that is very soluble in water but relatively impervious to decomposition by acids. It does not seem to be affected very much by air or light, nor does it pick up much water from the air around it.

Described as the first of the "unnatural" penicillins, the new drug is potassium alpha-phenoxyethyl penicillin. A synthetic chemical chain has been added to the basic skeleton of the original penicillin which is still made by molds, Dr. Menotti said.

Large-scale trials of the new drug have yet to be completed.

Announcement of the synthetic penicillin was made as part of the dedication ceremonies of the Bristol Laboratories' new $1,250,000 research facilities near Syracuse.

Science News Letter, November 7, 1959

VITAL STATISTICS

Women Marry Younger, Have Larger Families

MORE WOMEN are marrying at an earlier age and having larger families than they did 20 years ago, statistics show.

There were 41,500,000 married women in March of 1958. This is 3,750,000 more than there were in 1950 and 11,333,000 more than in 1940, Metropolitan Life Insurance Company figures reveal.

The rise has occurred mainly in younger women—those 18 or 19 years of age are marrying at the rate of one in three as compared to one in five in 1940. Among the 20 to 24 age group, two-thirds are married as against only half 20 years ago.

The birth rate has shot up too. In 1940 there were 125.9 births per 1,000 married women aged 15 to 44, while in 1956 this figure rose to 158.8 per 1,000 married women.

Larger families are becoming quite common, statisticians point out. The birth rate for third and fourth children more than doubled between 1940 and 1956. The rate for a fifth child almost doubled also. Furthermore, seven of every 10 babies are born to mothers under 30 years of age.

Nearly one-third of these American wives, or 13,000,000, were in the labor force in March, 1958. Reflecting the tendency of wives to seek work after their children grow up, nearly two out of every five married women in the 45 to 54 age group have jobs outside the home.

Science News Letter, November 7, 1959

ENGINEERING

Russia Builds A-Plants For Producing Electricity

RUSSIA IS now constructing two electric power plants that will run on atomic energy.

Back from a trip to Russia, Dr. Frank K. Pittman, director of the U. S. Atomic Energy Commission's division of reactor development, said stations are being erected at Voronezh and Byeloyarsk. Both will have electric outputs of 200,000 kilowatts.

Two other stations, respectively, are being built in Czechoslovakia and Yugoslavia.

The indications, he said, are that Russia's atomic power program is moving along with many of the same up's and down's as the United States program. This particularly applies to electricity production at a price competitive with power made with conventional fuels.

Russia already has an atomic power plant operating at Obninsk, producing 5,000 kilowatts of electricity. The U. S. station at Shippingport, Pa., rated at 65,000 kilowatts, can be operated at 100,000 kilowatts or modified to produce 150,000 kilowatts, Dr. Pittman said. The nation's 180,000-kilowatt Dresden station, near Chicago, already has gone critical and full power production is expected by mid-1960.

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METEOROLOGY

Longer Range Weather Forecasts

Weathermen are working to improve the 30-day forecasts. Their ultimate aim is to predict the weather at least 90 days in advance.

By ANN EWING

IN MAN'S NEVER-ENDING war with the weather, he has always wanted to know what next week's, next month's or next season's weather will be.

In times not too recently past, men looked for signs in the clouds, from which developed such proverbs as, "rain before seven, shine before eleven." Some have even depended on their aching corns to foretell the coming weather.

For longer range forecasts, men have examined the barks of trees, watched the timing of bird migrations or put their faith in woolly bear caterpillars as weather prophets.

Only in the past several decades have weathermen been able to say with some assurance what the elements have in store in the immediate future. Current weather forecasts for periods some 24 or 48 hours ahead for any particular locality are generally very accurate.

The predictions of weather five days in the future are the most accurate ever, and each year their reliability increases.

Weathermen are now working to improve the 30-day forecasts. Their ultimate aim is to predict the weather at least 90 days in advance.

Meteorologists believe that forecasting long-range weather is second in difficulty only to forecasting human behavior. For periods some 24 or 48 hours in the future, the many factors influencing the weather for any particular locality are quite well known and understood.

Long Range Forecasts

However, with increase in the future time for which forecasts are made, the difficulty of making them increases out of all proportion. For instance, although 24-hour predictions are very specific, the five-day forecasts give weather trends specifically in terms of temperatures and precipitation for state-wide or larger areas. A prediction issued on Wednesday, for instance, would not specify rain for a typical city on Sunday afternoon, but might call for precipitation over the weekend.

The regional five-day forecasts are issued by district forecasters, based on country-wide predictions made by the extended forecast section of the U. S. Weather Bureau's center in Suitland, Md. A high-speed electronic computer there does all of the routine calculations, once done laboriously by hand or by punched card machine.

The numerical weather predictions made by the electronic computer are then used as a basis for the nation-wide five-day forecasts issued by the Suitland center, and used by the regional offices for their outlooks.

Reason for the accuracy of the five-day forecasts is that meteorologists have some understanding of how planet-wide circulation patterns affect future weather. Because of this, they can put their knowledge into mathematical formulas stored in the computer. When the current weather, plus such climate information as average temperatures, are also put into the machine, the computer can calculate expected events.

So far, this can be done only on a state-wide or larger scale, except for temperatures, which can be given for 50 specific cities.

For 30-day forecasts, the necessary knowledge of how and why the world-wide circulation patterns change has yet to be spelled out in detail. Although the monthly outlooks, which are issued twice a month, are more often right than wrong, they are not as accurate as either those who issue them or those who use them would like. As with the five-day forecasts, however, they are becoming increasingly more reliable.

Meteorologists expect that, within the next five to ten years, they will have gained enough knowledge of atmospheric forces to make the 30-day predictions at least as accurate as the five-day ones are now. Some of this knowledge will result from experimenting with different mathematical techniques for predicting the weather, using computers for the calculations.

One ultimate aim of many meteorologists is to forecast the weather at least 90 days in advance. Jerome Namias, head of the U. S. Weather Bureau's extended forecast section, is now working on just such a program experimentally.

His research is aimed at developing a system for seasonal weather prediction. Mr. Namias, who pioneered the 30-day forecasts, said he had not been working on the extremely tough, 90-day problem long enough to know whether his methods will prove successful or not.

However, he said that some of his experimental results to date had been "encouraging," and he appears hopeful that the future will be even more promising.

Two Major Developments

The ability to predict the weather five, 30 or 90 days in the future with any reasonable expectation of being right is due in large part to two major developments of the last 25 years.

One was the introduction of the idea that surface weather is governed by high-altitude winds that move ceaselessly in a globe-girdling belt. The other was the ability to calculate the weather numerically, made possible by the use of high-speed computers.

Before the mid-30's, weather for a particular area was considered mainly a local event. Then the late Swedish meteorologist, Dr. Carl-Gustaf Rossby, proposed that weather predictions should be made after

MAPPING FUTURE WEATHER—Jerome Namias (right), head of the U. S. Weather Bureau's extended forecast section, examines one of the many maps currently issued to show weather across the United States and around the Northern Hemisphere several days in the future.

considering the present state of the atmosphere over the entire Northern Hemisphere and the history of its motions for the previous few months.

If the large-scale motions of the atmosphere were made visible by a vast number of free-floating balloons at about 20,000 feet above the surface, an observer on an earth-circling satellite would soon notice the balloons all drifted eastward relative to the earth.

Looking more closely, such an observer would see that the speed of this westerly current was not the same from pole to pole, but varied slowly with latitude. It would move fastest over the some 2,000 miles of the temperatures zones, or mid-latitudes, becoming much weaker or even reversing its direction over the poles and the equator.

The high-level river of air over the mid-latitudes does not flow in a straight path, but dips north and south as it moves, meandering in much the same way as a stream. Meteorologists call this great meandering current, which circles the earth, the planetary wave.

If the satellite observer viewed the myriad balloons floating in the earth's atmosphere even more carefully, he would find a constantly changing series of whirlpools and eddies embedded in the giant river of air.

Continually forming and disintegrating, these whirling air masses are depicted as high and low pressure areas on weather maps such as issued daily by the U. S. Weather Bureau. They also move from west to east, in a more or less regular way, at a speed slightly less than the planetary wave.

This regularity is what led first to the art of weather forecasting, then to the now-emerging science of weather prediction. By charting these flow patterns, meteorologists have learned to predict where high and low pressure areas will move in the future, based on their repeating patterns known from past motions.

Much more important, however, the atmosphere's regular motions show that air obeys the same laws as other fluids. Using many short-cuts, meteorologists are learning to apply these laws, some weather applications of which were perceived by the late Dr. Rossby, to the atmosphere.

Now, with the aid of computers, meteorologists hope to continue to improve their knowledge of atmospheric motions, leading to more accurate weather predictions for longer periods in the future.

Science News Letter, November 7, 1959

Do You Know

To assure decent housing to every American family by 1975, 35,000,000 *houses* must be built in the next 15 years—more than 2,250,000 a year.

Tobacco, next to money, is the item most handled in the U. S. every day, being sold in 1,400,000 retail outlets in a variety of forms.

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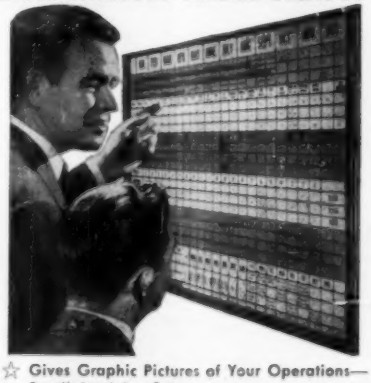

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ABOUT MISSILES AND MEN—Edward and Ruth Shaw Radlauer—*Melmont Pubs.*, 46 p., photographs, $2.50. Shows youngsters how missiles are produced.

ADVANCES IN ELECTRONICS AND ELECTRON PHYSICS, Vol. XI—L. Marton, Ed.—*Academic*, 523 p., illus., $15. Critical reviews of recent scientific work.

THE AGE OF THE WORLD: Moses to Darwin—Francis C. Haber—*Johns Hopkins Press*, 303 p., $5. A study in the history of ideas.

AMERICAN DEGREE MILLS—Robert H. Reid—*Am. Council on Educ.*, 110 p., paper, $1. See SNL Oct. 17, 1959, p. 254.

DISEASE DETECTIVES: Your Career in Medical Research—Harry Edward Neal—*Messner*, 192 p., illus., $3.50. Shows young people how to prepared for careers in medical science.

EDUCATIONAL PSYCHOLOGY AND CHILDREN—K. Lovell, foreword by P. E. Vernon—*Philosophical Lib.*, 2nd ed., 272 p., $6. British textbook.

ELECTRONICS ILLUSTRATED HAM RADIO HANDBOOK—Robert Hertzberg—*Arco*, 144 p., illus., $2.50. For the beginner.

ELEMENTS OF REINFORCED CONCRETE—Sylvan P. Stern—*Prentice-Hall*, 444 p., illus., $10.60. Combining theory and practical application.

THE FAR FRONTIER—William O. Steele—*Harcourt*, 185 p., illus. by Paul Galdone, $2.95. Juvenile biography about a boy and a naturalist.

FORMULA FOR DEATH, E=MC² (The Atom Bombs and After)—Fernand Gigon, transl. from French by Constantine Fitz Gibbon—*Roy Pubs.*, 223 p., photographs, $3.50. Describing the horrors of Hiroshima.

FROM GALAXIES TO MAN: A Story of the Beginnings of Things—John Pfeiffer—*Random House*, 234 p., illus., $4.95. The story of the evolution of the universe, of the earth and of man, based on discussions with many scientists in various branches of research.

GREEN UNIVERSE: The Story of Alexander von Humboldt—Edward F. Dolan, Jr.—*Dodd*, 244 p., $3.50. Biography for young people.

HOW ADULTS LEARN—J. R. Kidd—*Assn. Press*, 324 p., $4.75. Educator attempts synthesis of theory and experience regarding the learning of adults.

THE ILLUSTRATED BOOK ABOUT AFRICA—Felix Sutton, introd. by Stuart Cloete—*Grosset*, 102 p., illus. by H. B. Vestal, $3.95. The story of the "Dark Continent," its deserts, jungles, cities, peoples, customs, wildlife and vegetation.

INTERNATIONAL REVIEW OF NEUROBIOLOGY, Vol. 1—Carl C. Pfeiffer and John R. Smythies, Eds.—*Academic*, 383 p., illus., $10. Covers the whole field of neurobiology, including basic developments in neurology. Bibliographies.

THE JACK RABBIT—M. Vere DeVault—*Steck*, 30 p., illus. by Carol Rogers, $1.75. Gives children vivid picture of jack rabbit's habits.

LIVING BEYOND YOUR HEART ATTACK—Eugene B. Mozes—*Prentice-Hall*, 212 p., $3.50. Written by a heart specialist.

THE LOST CITIES OF AFRICA—Basil Davidson—*Little*, 366 p., illus., $6.50. Survey of what is presently known of the African past, based on the archaeological record south of the Sahara.

OUR SUN—Donald H. Menzel—*Harvard Univ. Press*, rev. ed., 350 p., illus., $7.50. Deals with all aspects of our growing knowledge concerning the relation of the sun to the earth, and the effects of the sun in space.

THE PERFORMANCE OF LUBRICATING OILS—H. H. Zuidema—*Reinhold*, 2nd ed., 205 p., illus., $7. Summarizes and evaluates data on the performance characteristics of lubricating oils under various conditions.

PRIMER OF LAMPS AND LIGHTING—Willard Allphin—*Chilton Co.*, 241 p., illus., $10. On characteristics and use of lamps.

RADIATION, GENES AND MAN—Bruce Wallace and Th. Dobzhansky—*Holt*, 205 p., illus., $3.95. Gives scientific background for a tentative evaluation of the magnitude of genetic radiation damage to human populations.

READING GERMAN for Scientists—Hans Eichner and Hans Hein—*Wiley*, 207 p., $5.25. Designed as a short cut to reading German scientific texts.

THE REALM OF THE NEBULAE—Edwin Hubble—*Dover*, 207 p., paper, $1.50. Reprint of 1936 first edition.

PROTEIN AND AMINO ACID NUTRITION—Anthony A. Albanese, Ed.—*Academic*, 604 p., $16. Collection of detailed presentations describing the current state of knowledge concerning this aspect of nutrition.

THE SCIENTIFIC AMERICAN BOOK OF MATHEMATICAL PUZZLES & DIVERSIONS—Martin Gardner—*Simon & Schuster*, 178 p., illus., $3.50. Mathematical recreation with commentary.

SHOW ME THE WORLD OF ELECTRONICS—Julian May—*Pennington Press*, 62 p., illus., by L. Jorjorian, $1.95. Aimed at ages 8 to 12.

SOAP-BUBBLES: Their Colours and the Forces Which Mold Them—C. V. Boys, preface by S. Z. Lewin—*Dover*, 193 p., illus., paper, 95¢. Unabridged reprint.

THE SURVIVAL BOOK—Paul H. Nesbitt, Alonzo W. Pond and William H. Allen—*Van Nostrand*, 338 p., illus., $7.50. Emergency procedures in desert, jungle, ice and water.

SYMPOSIUM ON EVOLUTION—Frederick C. Bawden and others—*Duquesne Univ.*, 119 p., $3. Lectures by a biologist, an anthropologist, a philosopher and a theologian.

(Continued on p. 310)

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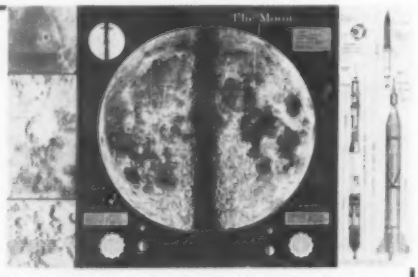

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Kodak reports on:

the nylon rope trick . . . microfilming brought down to the scientist's level . . . a little something for the taxpayers

A polyamide condensation for the kids to watch but keep their little hands off

collapsed film of nylon; do not touch until thoroughly washed; can be dried, melted, and pulled into threads
test glass
4.4 grams of 1,6-Hexanediamine (Eastman P5922) in 50 ml of H_2O, carefully poured on
2 ml of Sebacyl Chloride (Eastman 6236) in 100 ml of CCl_4

Du Pont, which doesn't ordinarily manufacture its nylon this way, was kind enough to publish this in J. Chem. Education *36, 182. We have been kind enough to prepare an abstract. Price for our minimum package quantities of the two reactants comes to $6.05. Teachers and Yuletide-bent daddies are reminded of the insidious nature of chlorinated hydrocarbons. Anyone inspired to commercial thoughts is advised to consult with his lawyer about U. S. Patent No. 2,708,617. Everyone who wants these or any of the approximately 3700 organic chemicals we stock (and catalog in Eastman Organic Chemicals, List No. 41) should get in touch with Distillation Products Industries, Eastman Organic Chemicals Department, Rochester 3, N. Y. (Division of Eastman Kodak Company).*

Less than a laundry

Our subsidiary, Recordak Corporation, has recently come out with a portable microfilmer that weighs only 24 pounds and lists for only $845. Do you ask what this has to do with science? Then we are wracked by ambivalent feelings toward you. On the one hand, we feel extra respectful in your presence; a mind so obviously unaccustomed to seek solace in gadgetry is scarce. At the same time, we want to turn you gently toward the light. Certainly you're not the type to seek your solace in paper-shuffling, but you have to prove that, if only to yourself.

Think for a moment like that fabled monster, the efficiency expert. His baleful eye casts about for concentrations of paper. When he sees information being extracted from one pile of papers for summary on yet another piece of paper, his mouth waters. When he sees some poor soul toiling at a task that could go undone but for the necessity of preserving proof of the finer details, he pounces. Our subsidiary, Recordak Corporation, watches from the bushes and purrs benevolently. Get the picture?

It all began in banks a generation ago, spread to department stores and phone companies, and in the last decade has reached enterprises like dry-cleaning establishments, dairies, and medical clinics. Now the idea of microfilming while summarizing has been brought down to the scientist's level. The Recordak Portable Microfilmer is of the right scale in size and cost for work of lesser magnitude (from Recordak's special viewpoint) than getting out the monthly statements of a prosperous laundry.

Documents are fed into the machine face up and returned face down in their original sequence. They are freed for other use, or they can be dumped and yet remain retrievable. They can be up to 12 inches wide and of any length. Reduction ratio is 20:1. Forty-six 8½″ x 11″ sheets can be microfilmed in a minute, smaller documents proportionally faster. Two 100-foot rolls of film can be exposed simultaneously to the same subject matter. Film units are readily removable so that "one-subject" records can be kept separate even though microfilming be done intermittently.

Recordak Corporation, 415 Madison Avenue, New York 17, N. Y., has a nationwide chain of branch offices and processing stations. It is just possible that your problem will remind the salesman of one he solved for the wholesale chicken business and that he will take you out and show you how it works there.

Microelectronics

Ever hear of the Diamond Ordnance Fuze Laboratories? It's a Department of the Army agency in Washington. To support DOFL, the average citizen shells out the federal tax on, let us say, several gallons of gasoline a year or a little tobacco. Since a fuze is a device which times an explosion to blow up his enemy, he probably wouldn't mind the expense if it were explained to him. But, *mirabile dictu* and happy day, prospects brighten that the piddling investment will pay off beyond the dreams of avarice!

DOFL has spawned "microelectronics," the shrinking of electronic assemblies to 1/100 normal size. DOFL became involved through the proximity fuze program, which requires very small and exceedingly rugged components. We are involved through *Kodak Photo Resist, Kodak High Resolution Plates,* and *Kodak Ektagraph Film.* Microelectronics may be bigger than both of us. It may make possible the placement of electronic devices inside the body, for diagnosis or for replacement or repair of human organs with electronic equivalents. It may permit a new directness in the study of the central nervous system.

The theme of microelectronics is that if you want environment-immune, highly "intelligent" circuitry that can handle problems of logic and fit into a tenth of a cubic inch of space or so, you quit at an early stage of the design thinking of transistors, diodes, capacitors, resistors, and such. Instead you think of the circuit as one or more plates half a millimeter thick and fabricated as intricately as necessary out of various conductive, semi-conductive, and dielectric materials disposed among the three dimensions of each plate.

The technique (at least prior to mass-scale production) uses *Kodak High Resolution Plates* on which the geometry of the various sub-circuits is photographed from drawings at great reduction. These then become the masks under which are exposed to ultraviolet light the circuit substrate plates that have been coated with *Kodak Photo Resist.* Where the mask passes u-v, subsequent processing removes the resist and lays open the substrate for either removal of material or insertion of other materials by evaporation, printing, electro-deposition, or chemical deposition. In some operations, deposition is done by squeezing material through openings left in a fine screen in accordance with an applied pattern of blocking, photographically reduced to *Kodak Ektagraph Film.*

The next thing to do is to send to Eastman Kodak Company, Special Sensitized Products Division, Rochester 4, N. Y., for a reprint of "The DOFL Microelectronics Program." Literature on the three Kodak products mentioned here will be thrown in. Thus we nudge you toward great undertakings.

Prices are list and subject to change without notice.

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TRADE MARK

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science

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Books of the Week

(Continued from p. 308)

TEXTBOOK OF GENERAL PHYSIOLOGY—Hugh Davson—*Little,* 2nd ed., 846 p., illus., $14.50. For the advanced student and research worker.

THERE'S ADVENTURE IN GEOLOGY—Julian May—*Pop. Mechanics,* 160 p., illus. by R. Borja, $2.95. Acquaints boys with geologist's career.

TOPS AND GYROSCOPES—R. W. Campbell—*Crowell,* 174 p., illus. by T. W. Hogan, $3. Aimed at intermediate level, includes bibliography.

THE TRANSIT OF VENUS: A Study of Eighteenth-Century Science—Harry Woolf—*Princeton Univ. Press,* 258 p., illus., $6. Detailed account of the English and French astronomical expeditions of 1761 and 1769, and interpreting the results in the light of modern science.

TREATISE ON ANALYTICAL CHEMISTRY, Part I: Theory and Practice, Vol. 1—I. M. Kolthoff and Philip J. Elving, Eds., asst'd by Ernest B. Sandell—*Interscience,* 809 p., illus., $17.50. Presents a concise, critical, comprehensive and systematic treatment of classical and modern analytical chemistry.

THE VANISHING ADOLESCENT—Edgar Z. Friedenberg—*Beacon Press,* 142 p., $2.95. Sociological study of the dynamics of adolescence.

WHO GOES TO GRADUATE SCHOOL?: A Study of the Decision to Enter Graduate Training—George L. Gropper and Robert Fitzpatrick—*Am. Inst. for Research,* 66 p., paper, single copies free upon request direct to publisher, 410 Amberson Ave., Pittsburgh 32, Pa.

WILFRED GRENFELL: His Life and Work—J. Lennox Kerr—*Dodd,* 270 p., illus., $4. Biography of a great medical missionary.

Science News Letter, November 7, 1959

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ELECTRONIC EQUIPMENT

SUN CELLS—LIKE USED IN MOON ROCKETS, with instructions and diagrams. 50c. Transistor kits and supplies. Send for catalogue. Radio-Ore Labs., 38 Oneida St., Lynn, Mass.

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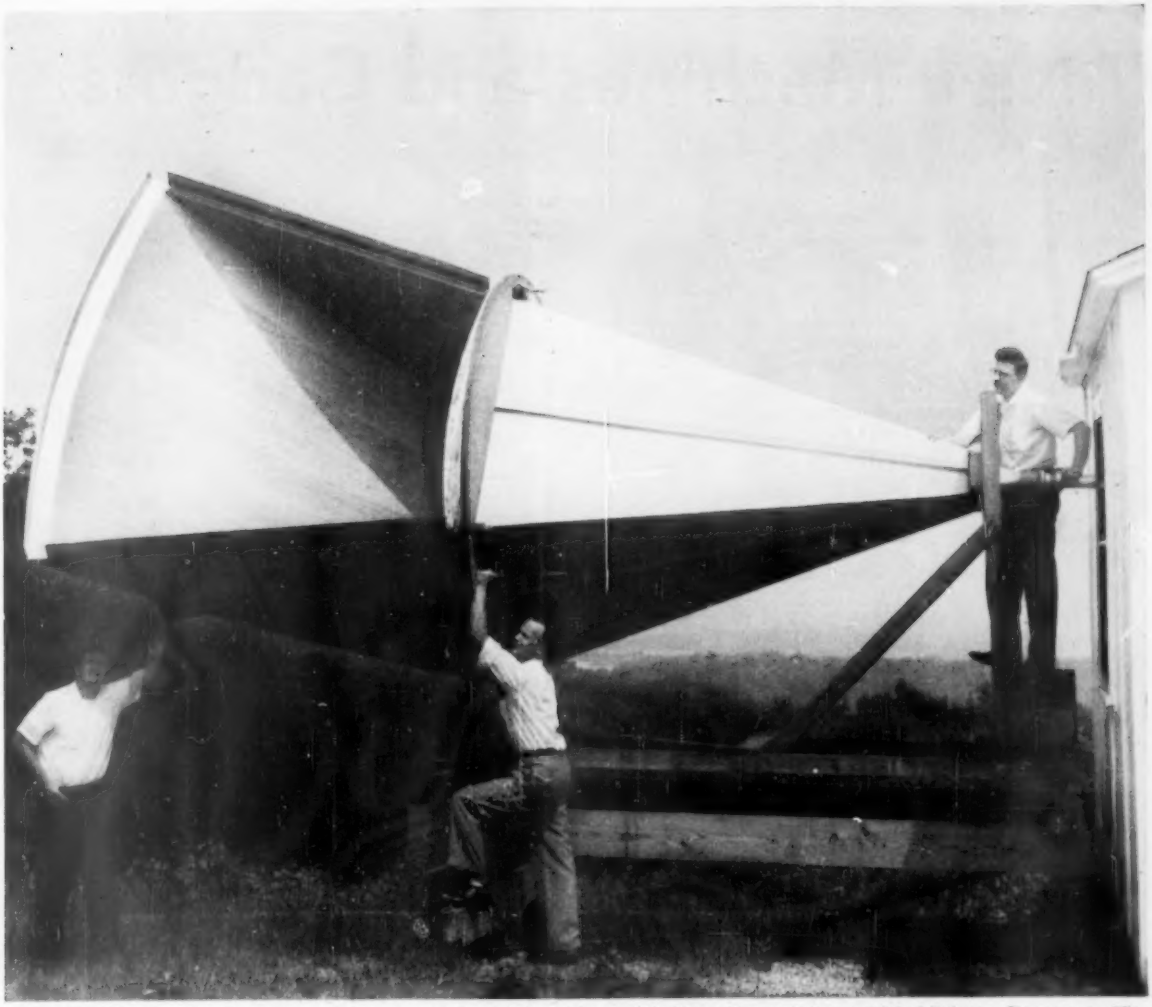
MICROSLIDES: INSECTS, MARINE LIFE, ZOological, Botanical, British Fresh Water Algae. Send for Complete list Free. Ealbe Laboratory Supplies, 459 Bloor St., W., Toronto, Ontario, Canada.



At Bell Laboratories, Holmdel, N. J., a horn reflector antenna is beamed skyward by scientists Edward Ohm, David Hogg and Robert DeGrasse. The maser amplifier, which employs a ruby cooled in liquid helium, is inside building at right. Over-all "noise" temperature of antenna, amplifier and sky is only 18°K at 5600 megacycles.

ANOTHER STEP TOWARD SPACE COMMUNICATIONS

The above antenna is part of a new ultra-sensitive radio receiving system under development at Bell Telephone Laboratories. It has extraordinary directivity. Beamed skyward, it ignores radio "noise" from the earth, yet picks up extremely weak signals from outer space.

The signals are amplified by the latest Bell Laboratories "maser" amplifier. The maser principle was first demonstrated, using gas, by Prof. C. H. Townes and his collaborators at Columbia University. Bell Laboratories scientists applied it to the solid state guided by a theoretical proposal of Prof. N. Bloembergen of Harvard University. Their latest traveling wave maser amplifier employs a ruby mounted in a waveguide. The ruby is excited to store energy. As signals pass through, they absorb this energy and are thus amplified. The device uniquely combines the characteristics needed for practical space communication: extremely low inherent noise and the ability to amplify a broad frequency band.

At present the receiving system is being used to pick up and measure minute radio noise generated by the atmosphere. It also foreshadows important advances in long distance communications. For example, it could extend the range of space-probe telemetering systems, could help make possible the transatlantic transmission of telephone and TV signals by bouncing them off balloon satellites—and has numerous applications in radio astronomy and radar.

This pioneer development in radio reception is one more example of the role Bell Laboratories plays in the pursuit of better communications technology.

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AUTOMATIC-SUSPENSION SCALES are calibrated with certified test weights to an accuracy of one-tenth of one percent. They have a 16-inch-diameter dial and are available in eight maximum capacities ranging from 250 pounds to 10,000 pounds. Operation is based on compound levers.

Science News Letter, November 7, 1959

SUN LAMP KIT includes an improved type bulb, holder and metal reflector. The bulb starts tanning in one minute after it is turned on. The lamp produces a combination of infrared, ultraviolet and white light. The reflector is also suitable for use with infrared heat lamps and photoflood bulbs.

Science News Letter, November 7, 1959

INDELIBLE MARKER writes on difficult surfaces including rough lumber, abrasive metals, machinery, wiring, wall materials and fiber boards. It has a stainless steel, ball-type head on an unbreakable and refillable plastic squeeze-bottle container.

Science News Letter, November 7, 1959

TELEPHONE-DIAL LAMP shown in photograph, is made of clear plastic with a colorful glass-fiber shade. It uses as a base

any table telephone which has a rear finger-grip pick-up. Easily installed or removed without tools, the lamp illuminates the entire telephone area and dial.

Science News Letter, November 7, 1959

TOASTER INSERTS of metal may be placed in the bread slot of a toaster to aid in recovering small broken bread pieces that may be stuck. They also make it easier to toast sliced muffins, doughnuts, biscuits and bagels, as well as pound cake and waffles.

Science News Letter, November 7, 1959

TILE WALL PLAQUE records the baby's name, birthplace, exact hour and date of arrival, and the weight at birth. The tile, imported from Holland, is hand painted in soft pastel colors.

Science News Letter, November 7, 1959

SOLDERING TOOL enables the do-it-yourselfer to solder aluminum quickly and easily. The tool is a long-handled holder for a glass-fiber brush insert. When rubbed through molten solder on the metal surfaces to be joined, the brush abrades the metal, removing oxide for a firm, smooth joint.

Science News Letter, November 7, 1959

SCREEN FOR CHAIN LINK FENCE is made by using strips of brightly colored vinyl-coated aluminum, snapped into place between the chain links. Tie-in slats, woven diagonally through the links at intervals, anchor the strips in place. An attractive screen is thus formed, giving privacy and wind protection for pools, patios, etc.

Science News Letter, November 7, 1959

Nature Ramblings

By HORACE LOFTIN

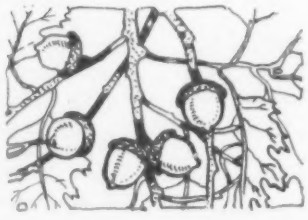
HOW MANY acorns on an oak tree?

It may be an odd question, but it is a fair one and an important one. Taking a first guess for a large old tree, you know that hundreds would be too few. Several thousand would not be enough, either. Probably a massive, ancient oak bears many, many thousands of acorns each season, each potentially a new oak tree.

Let us say, then, that such an oak would bear conservatively 100,000 acorns. Now this hypothetical oak is in the midst of a hypothetical forest of mighty oaks, each of which may bear at least that same number of acorns. It is obvious that if each acorn were to flourish, soon the earth would be crowded with nothing but oaks—no room, certainly, for human beings!

The same is true with insects, or with oysters, or fish, or rodents. All living organisms have a reproductive rate vastly in excess of the numbers of individuals "needed" to replenish their kind. Actually,

Spendthrift Nature



in all its many years of life, the mighty oak must only produce one oak offspring to reach maturity in order to replace itself. A male and female codfish need only produce two individuals which will mate and reproduce, in order to replenish themselves. Yet each female codfish may lay hundreds of thousands of eggs each year of a long life.

Why this prodigious rate of reproduction then? Consider these questions: Of the thousands of acorns borne by the oak, how many furnish food for squirrels, birds and other animals? How many are damaged by boring insects?

Of the relatively few acorns that manage to germinate and begin to grow, how many then escape the destructive work of insects? How many are browsed away by deer and cattle? How many die in fire or drought? How many fail to compete with larger and older oaks in a struggle for available food, moisture and sunlight?

Over many generations, it will be seen that each oak, or each plant or animal, produces enough offspring (that in turn come to have young) to reproduce itself under given conditions of life.

If for some reason more land, more food, fewer predators or other causes make it possible for a species to maintain larger numbers, additional animals will survive to the limit that conditions will allow. It takes the great number of acorns, eggs or young to insure that the minimum number survive the hazards of just living.

Nature is prodigious but harsh.

Science News Letter, November 7, 1959